Revue suisse de Zoologie, 101 (3) : 601-622; septembre 1994

A taxonomic review of the Oriental species of the genus *Ancyronyx* Erichson, 1847 (Coleoptera, Elmidae)

Manfred A. JÄCH
Naturhistorisches Museum, Burgring 7, A-1014 Wien, Österreich.

A taxonomic review of the Oriental species of the genus *Ancyronyx* Erichson, 1847 (Coleoptera, Elmidae). - The Oriental species of the genus *Ancyronyx* Erichson are revised. It is shown that *A. acaroides* Grouvelle is correctly placed in the genus *Ancyronyx*. Five new species and one new subspecies are described: *Ancyronyx acaroides cursor* ssp. n. (Bali), *A. johanni* sp. n. (Siberut), *A. malickyi* sp. n. (Sumatra, Thailand, Borneo), *A. procerus* sp. n. (Borneo), *A. sarawacensis* sp. n. (Borneo) and *A. schillhammeri* sp. n. (Mindoro). A lectotype is designated for *A. acaroides*. A key to the world species is included. *Ancyronyx constrictus* Reitter is transferred to the genus *Stenelmis* Dufour.

Key-words: Coleoptera — Elmidae — *Ancyronyx* — Oriental Region — taxonomy.

INTRODUCTION

Erichson (1847: 522) erected the genus *Ancyronyx* on one species from North America (*Macronychus variegatus* Germar). Half a century later, Grouvelle (1896) described a second species (*A. acaroides*) in this genus. According to the original description the provenience of *A. acaroides* was Palembang in Sumatra! Because of the peculiar distribution pattern and due to the fact that *A. acaroides* had not been collected again, 20th century specialists of Elmidae doubted whether the locality given for *A. acaroides* was correct or whether it was correctly assigned to this genus.
It was almost 100 years later (in 1991) that S. Schödl and I re-collected *Ancyronyx acaroides* in Sumatra and in 1992/1993 also in West Malaysia, Sarawak and Bali, thus confirming the disjunct distribution pattern of the genus. Between 1991 and 1994 *A. acaroides* and 5 additional (hitherto undescribed) species of *Ancyronyx* were collected by myself and other Austrian, German, Slovakian and Czech coleopterists (M. Balke, L. Hendrich, J. Horak, J. Kodada, H. Malicky, S. Schillhammer, S. Schödl) in various countries of southeast Asia (Thailand, Malaysia, Indonesia, Philippines) providing the basis for a taxonomic revision of the genus.

Manuscript accepted le 10.12.1993.

Two additional Oriental species which were listed by ZAITZEV (1910: 40) as *Ancyronyx quadriplagiatus* Motschulsky from Sri Lanka and *A. constrictus* Reitter from Sumatra belong to other genera: JÄCH (1984: 304) has transferred *A. quadriplagiatus* to the genus *Podelmis* Hinton while *A. constrictus*, of which I have seen the holotype is a *Stenelmis* Dufour.

MATERIAL

The material used for this study is deposited in the following institutions and private collections (abbreviations are used to refer to collections in the text):

CBHB Coll. Balke & Hendrich, Berlin
CHP Coll. Horak, Praha
CKB Coll. Kodada, Bratislava
MHNG Muséum d'Histoire Naturelle, Genève
MHNP Muséum national d'Histoire Naturelle, Paris
NMP Národní Museum v Praze
NMW Naturhistorisches Museum, Wien
SIW Smithsonian Institution, Washington, D.C. [= National Museum of Natural History]
SNMB Slovenské Národné Múzeum, Bratislava
TMB Természettudományi Múzeum, Budapest

TAXONOMY

genus **Ancyronyx** Erichson

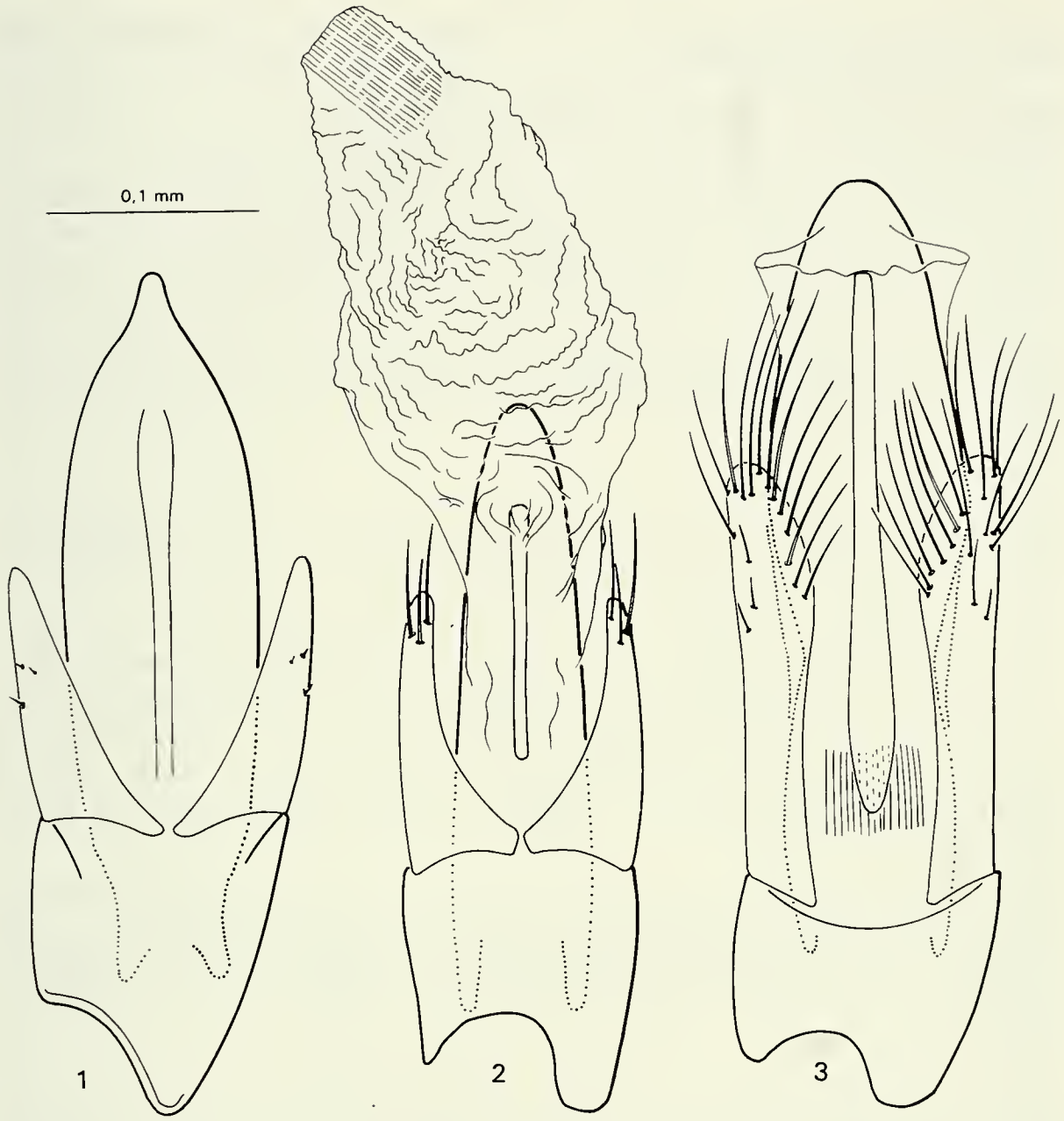
Diagnosis. Within Elmidae the genus *Ancyronyx* is easily recognized by the following characters: pronotum divided by a transverse groove, prosternum not or very feebly produced anteriorly (Fig. 16); prosternal process distinctly wider than long (Fig. 16), all coxae widely separated and thus positioned conspicuously lateral, pro- and mesocoxae visible from above (!) (Figs 23-28); legs enormously long, distinctly longer than body; claws large and toothed; wing venation (Figs 20, 21). Aedeagus: ejaculatory duct evertible. Female genitalia (Figs 10-15): main piece very short, often with strong blunt spines. All species are vividly coloured.

Biology. Most specimens were taken from submerged wood in rather fast flowing unpolluted streams and rivers. Some specimens (e. g. most specimens of *A. malickyi* sp. n.) were attracted by light traps.

Ancyronyx acaroides acaroides Grouvelle

Ancyronyx acaroides GROUVELLE, 1896: 50. - ZAITZEV 1910.
Pseudancyronyx acaroides, BERTRAND & STEFFAN 1963.

Type locality. Palembang, southern Sumatra, Indonesia.
Material examined. Lectotype ♂, by present designation (NMW): "Grouvelle 1901 Palembang Sumatra \ Acyronyx acaroides Grouv. \ acaroides Grouv. Sumatra Palembang". Paralectotypes:



FIGS 1-3

Aedeagus (ventral aspect) of 1) *Ancyronyx variegatus*, 2) *A. malickyi* sp. n., endophallus extended, 3) *A. schillhammeri* sp. n. Endophallus not illustrated in Figs 1 and 3.

one male in NMW; 48 specimens in MHNP (Grouvelle collection). There are probably more syntypes in other collections. Number of syntypes not known: "une assez longue suite d'exemplaires".

Additional material examined:
WEST MALAYSIA: PERAK: Lawin, S Gerik, 4.II.1992, leg. Jäch (NMW);
PENANG: Botanical Garden, 27.I.1992, leg. Jäch (NMW).
SARAWAK: Mulu NP, tributary of Tutoh River, near Long Iman, 4.III.1993, leg. Jäch (NMW); Rumah Ugap Ng, III.1994, leg. Kodada (CKB, NMW).

INDONESIA: W SUMATRA: Sicincin, 50 km NW Padang, 13.II.1991, leg. Jäch (NMW); Panti, 300 m, 5.II.1991, leg. Schödl (NMW).

Distribution (Fig. 22). Peninsular Malaysia, Borneo, Sumatra.

Description. 1.8-2.1 mm long. Body form obovate; dorsal surface convex.
Colour yellowish, head posterior to antennal insertion, middle of pronotum anterior to transverse groove, a number of spots on the elytra (a sutural spot, about one puncture diameter behind scutellum; a triangular patch extending from elytral striae 3-7 on the basal half of the elytra; a larger sutural spot on the declivity and a subapical spot extending from elytral striae 5-8 and separated from the sutural spot only by the yellowish 5th interstria), apex of all femora and proximal half of all tibiae dark brown to black. Terminal antennal segment, lateral parts of metasternum, tarsi and apices of all tibiae brown.

Labrum almost as long as clypeus, its front margin feebly emarginate apico-medially. Dorsal surface of head more or less impunctate and glabrous, frons occasionally moderately densely punctate. Antennae 11-segmented, slender, about as long as pronotum.

Pronotum slightly wider than long; widest near basal third; anterior margin strongly arcuate; lateral margin sinuous; sides distinctly margined; hypomera moderately densely punctate, visible from above; a well impressed sinuous transverse groove divides the pronotum into a shorter apical and a longer basal part; surface of pronotum usually smooth and impunctate, only occasionally moderately densely punctate. Scutellum triangular, slightly wider than long; acuminate apically; glabrous; each side with a small gibbiform tubercule.

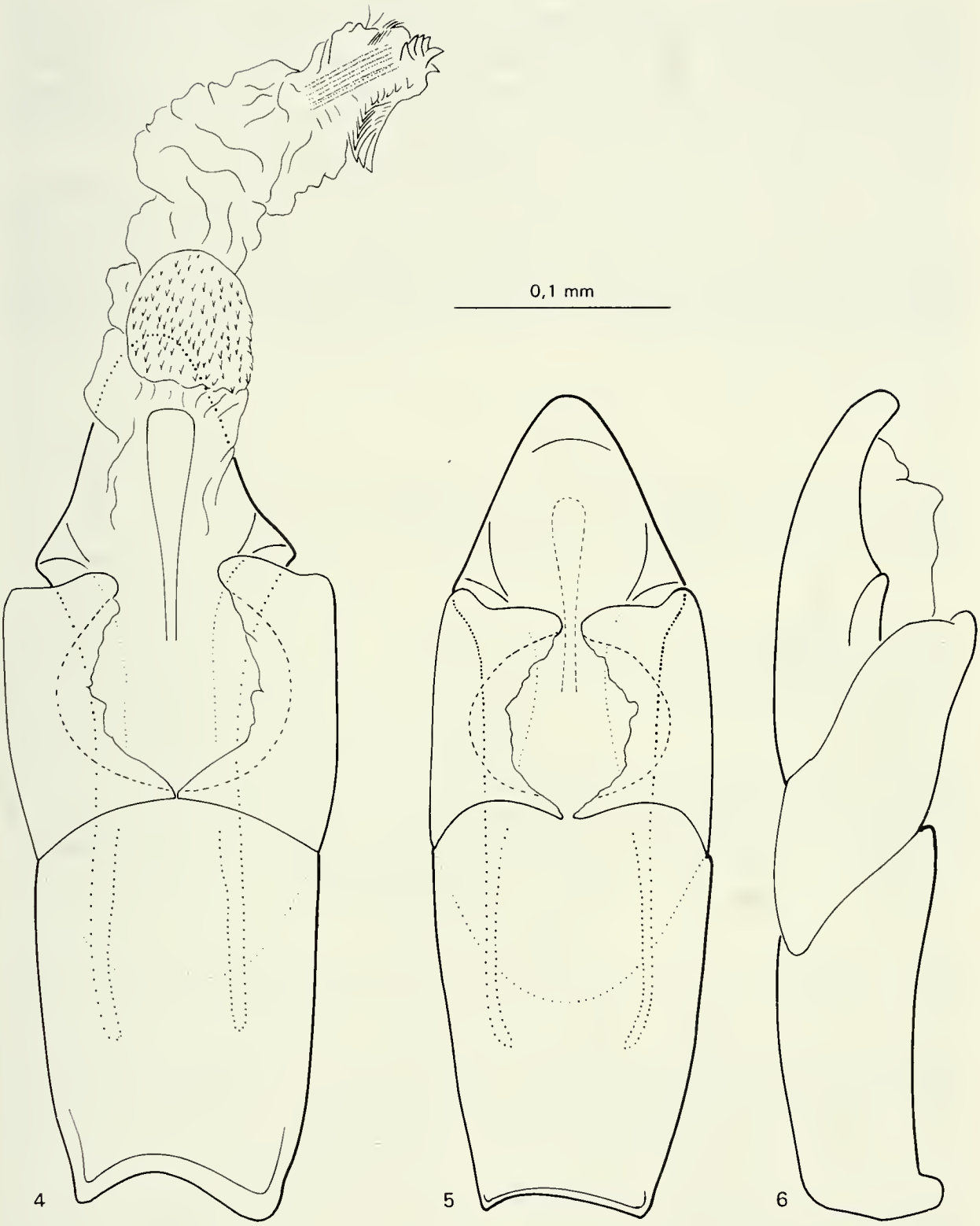
Elytra approximately 2.3 times longer than pronotum; widest near basal one fourth; with 10 rows of punctures between suture and lateral margin; punctures not very deeply impressed; intervals more or less flat, impunctate and glabrous; explanate margin of elytra very narrow; humeri prominent; elytral apices conjointly rounded. Hind wing venation (Fig. 20).

Prosternum distinctly wider than long, only very feebly produced in front of procoxae; posterior margin distinctly bisinuous. Mesosternum very short; distinctly depressed medially for reception of apex of prosternum. Metastermum large, with a shallow, narrow, longitudinal groove on midline; discal area smooth and glabrous; lateral declivity with plastron, moderately densely punctate.

Legs very long; each leg distinctly surpassing body length; at least partly covered with a very fine plastron; pro- and mesocoxae very large, clearly visible from above; claws very prominent, basis of each claw with two small teeth.

Abdomen with 5 visible segments; sides of abdominal sterna 1-3 and sterna 4 and 5 entirely covered with a distinct plastron. Female sternite VIII (Fig. 18).

Aedeagus (Fig. 5): Penis (median lobe) rather short and stout, laterally strongly produced to form distinct angles; basal lateral apophyses long; fibula very weakly sclerotized and hardly visible; ejaculatory duct evertible; corona present, in repose situated near the basis of the parameres; a comb- or rake-like structure, which consists

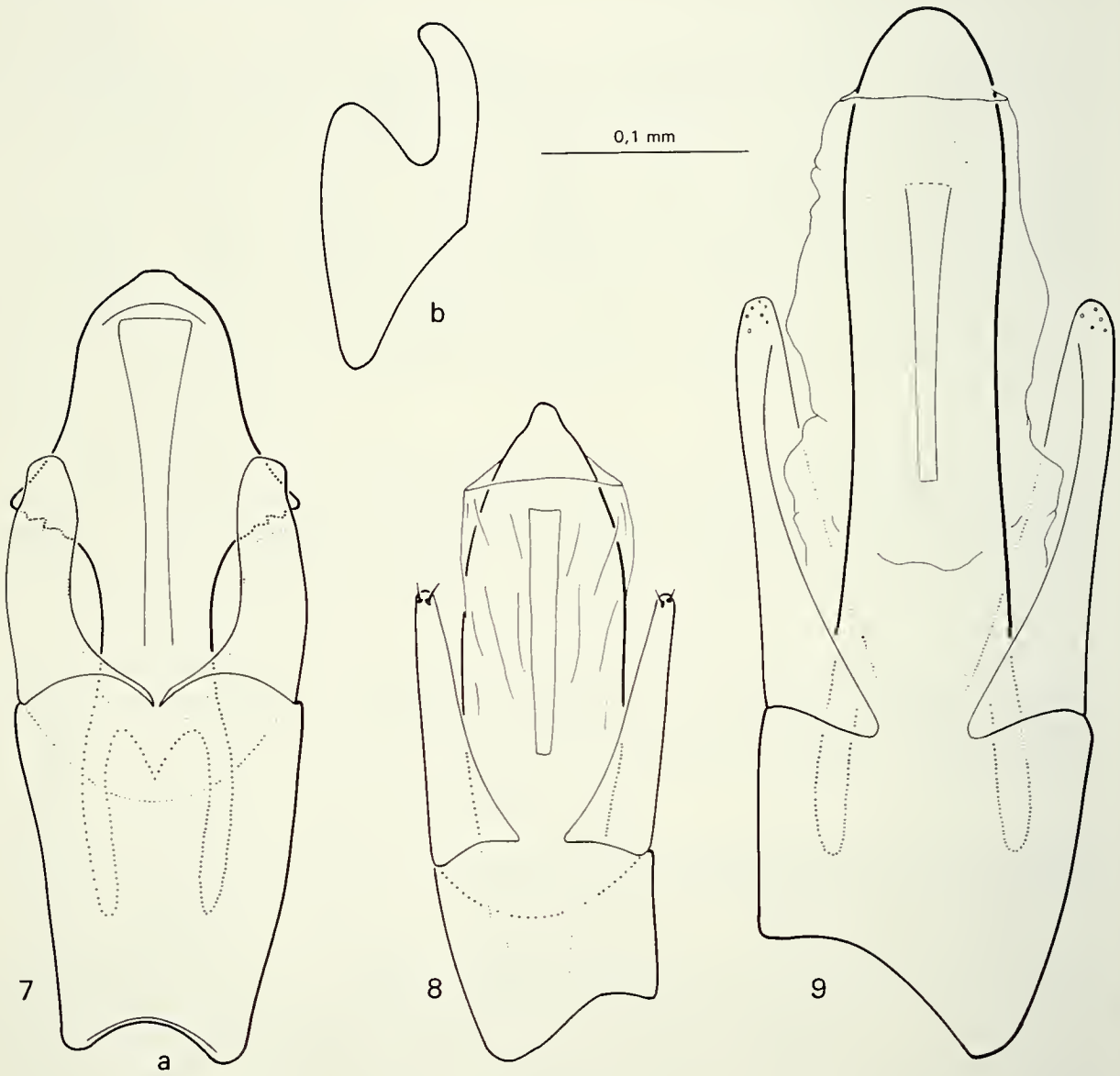


FIGS 4-6

Aedeagus of *Ancyronyx acaroides*: 4) ssp. cursor n., ventral aspect, endophallus extended, 5) ssp. *acaroides*, ventral aspect, (6) ssp. *acaroides*, lateral aspect. Endophallus not illustrated in Figs 5 and 6.

of a series of parallel spine-like plates, is always situated near the corona and may be regarded as a part of it; a group of spines can be observed near the apex of the penis, the position of these spines remains the same, regardless of the condition of the ejaculatory duct (everted or in repose); this group of spines may prove to function as an operculum. Parameres short and stout, apically truncate and produced mediad (ventral aspect), not distinctly emarginate in lateral aspect. Phallobasis moderately long.

Ovipositor (Fig. 10): Terminal segment short and slender. Preapical segment (main piece) short and stout, its distal sclerite approximately as long as proximal sclerite; distal sclerite with numerous spines in apical half, median margin finely pubescent; large parts of proximal sclerite finely striolate. Basal sclerite shorter than main piece and terminal segment together.



FIGS 7-9

Aedeagus (endophallus not illustrated) of 7a) *Ancyronyx johanni* sp. n., ventral aspect, 7b) same, lateral view of paramere, 8) *A. sarawacensis* sp. n. and 9) A. procerus sp. n.

Variability. Anterior sutural spot extended to form a transverse band, reaching at least elytral stria 4, in all specimens from West Malaysia and a few specimens from Sarawak. In a few specimens the sutural spot (band) is almost obsolete and indicated only by a faint brownish tinge or by the obscured elytral punctures. Head occasionally entirely brown. Pronotum anterior to transverse groove occasionally entirely black.

Ancyronyx acaroides cursor ssp. n.

Type locality. Stream, ca. 3 m wide, between Tegalalang and Ubud, southern Bali, Indonesia.

Material examined. Holotype ♂ (NMW): "Indonesien 1992 Bali (3), Ubud- Tegalalang leg. Schödl 11./12.IV". Paratypes: 14 specimens from the type locality, leg. Schödl and Jäch (NMW, MHNG); 24 specimens: "Indonesia / Bali Ubud ca. 300 m / BA 1&2 25. & 26.8.1990, Bach leg: Balke & Hendrich" (NMW, CBHB, SIW).

Distribution (Fig. 22). So far known only from the surroundings of Ubud, southern Bali.

Diagnosis. Coloration of pronotum usually somewhat darker than in *A. acaroides acaroides*; pronotum anterior to transverse groove usually entirely dark brown or black; occasionally posterior section of pronotum with a few small dark spots or even entirely dark brown. Dorsal surface of pronotum usually moderately densely punctate and only occasionally smooth and impunctate.

Aedeagus (Fig. 4): Differs from *A. acaroides* cursor only in the slightly longer apical part of the penis, which can be observed only when several aedeagi (floating in lactic acid or glycerin) of both subspecies are compared with each other directly. Ejaculatory duct (endophallus) like in the western subspecies.

Etymology. Cursor (Latin) - runner. In contrast to the cryptic behavior of the western subspecies from West Malaysia, Borneo and Sumatra, specimens from Bali move around surprisingly quickly when caught in a water beetle net. Due to their long legs they may develop a quite remarkable speed.

Ancyronyx johanni sp. n.

Type locality. Stream near the village of Madobak, west of Muarasiberut, Siberut Island (west of Sumatra), western Indonesia.

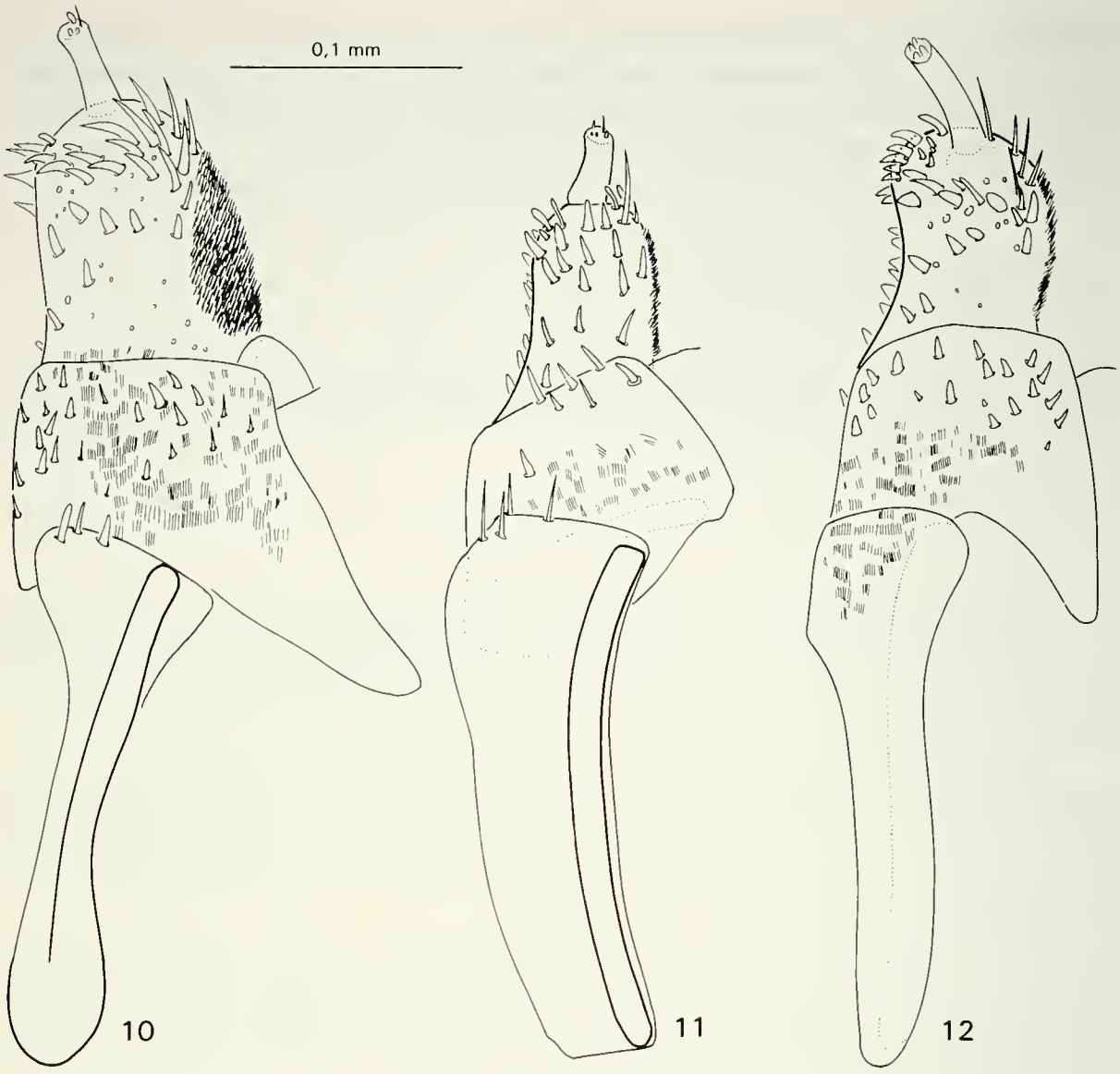
Material examined. Holotype ♂ (NMW): "Indonesien 1991 (25) Siberut, Madobak W Muarasiberut leg. Jäch 19.2.". One paratype ♀ from the same locality is also housed in the NMW.

Distribution (Fig. 22). So far known only from the type locality.

Diagnosis. 1.8-2.0 mm long. Body form as in *A. acaroides*.

Colour yellowish, head posterior to insertion of antennae, pronotum except anterior margin, scutellum, parts of elytra (see Fig. 24), apex of all femora and proximal half of all tibiae dark brown to black. Terminal antennal segment; head anterior to insertion of antennae; epipleura; lateral parts of meso- and metasternum and first 4 abdominal segments; tarsi and apices of all tibiae brown.

Surface of labrum and clypeus more or less impunctate and glabrous, frons densely punctate. Antennae 11-segmented, slender, about as long as pronotum.



FIGS 10-12

Ovipositor (ventral aspect) of 10) *Ancyronyx acaroides*, 11) *A. variegatus* and 12) *A. schillhammeri* sp. n.

Pronotum very slightly wider than long; widest near basal third; anterior margin strongly arcuate; lateral margin sinuous; sides distinctly margined; hypomera moderately densely punctate, visible from above; a well impressed sinuous transverse groove divides the pronotum into a shorter apical and a longer basal part; surface of pronotum densely punctate. Scutellum triangular or rectangular, wider than long; acuminate apically; glabrous; each side with a very small gibbosity.

Elytra approximately 2.25 times longer than pronotum; widest near basal one fourth; with 10 rows of punctures between suture and lateral margin; punctures not very deeply impressed; intervals more or less flat, impunctate and glabrous; explanate margin of elytra very narrow; humeri prominent; elytral apices conjointly rounded.

Prosternum distinctly wider than long, only very feebly produced in front of procoxae; posterior margin distinctly bisinuous. Mesosternum very short. Metasternum large, with a shallow, narrow, longitudinal groove on midline; discal area smooth and glabrous; lateral declivity with plastron, moderately densely punctate.

Legs very long; each leg distinctly surpassing body length; at least partly covered with a very fine plastron; pro- and mesocoxae very large, clearly visible from above; claws very prominent, basis of each claw with two small teeth.

Abdomen with 5 visible segments; plastron not clearly visible with stereoscopic microscope.

Aedeagus (Fig. 7): It can be distinguished from *A. acaroides* by a number of characters: 1) apex of penis larger (wider and longer), 2) sides more strongly produced, 3) parameres deeply emarginate in lateral view (Fig. 7b), 4) apex of parameres not produced mediad. Ejaculatory duct probably very similar to that of the former species; in the holotype it is in repose.

Ovipisitor not examined.

Etymology. Named for our native guide Johannes from the village of Toteburu (southern Siberut).

Ancyronyx malickyi sp. n.

Type locality. Dolok Merangir, at light, 99°11' E/3°07' N, northern Sumatra, western Indonesia.

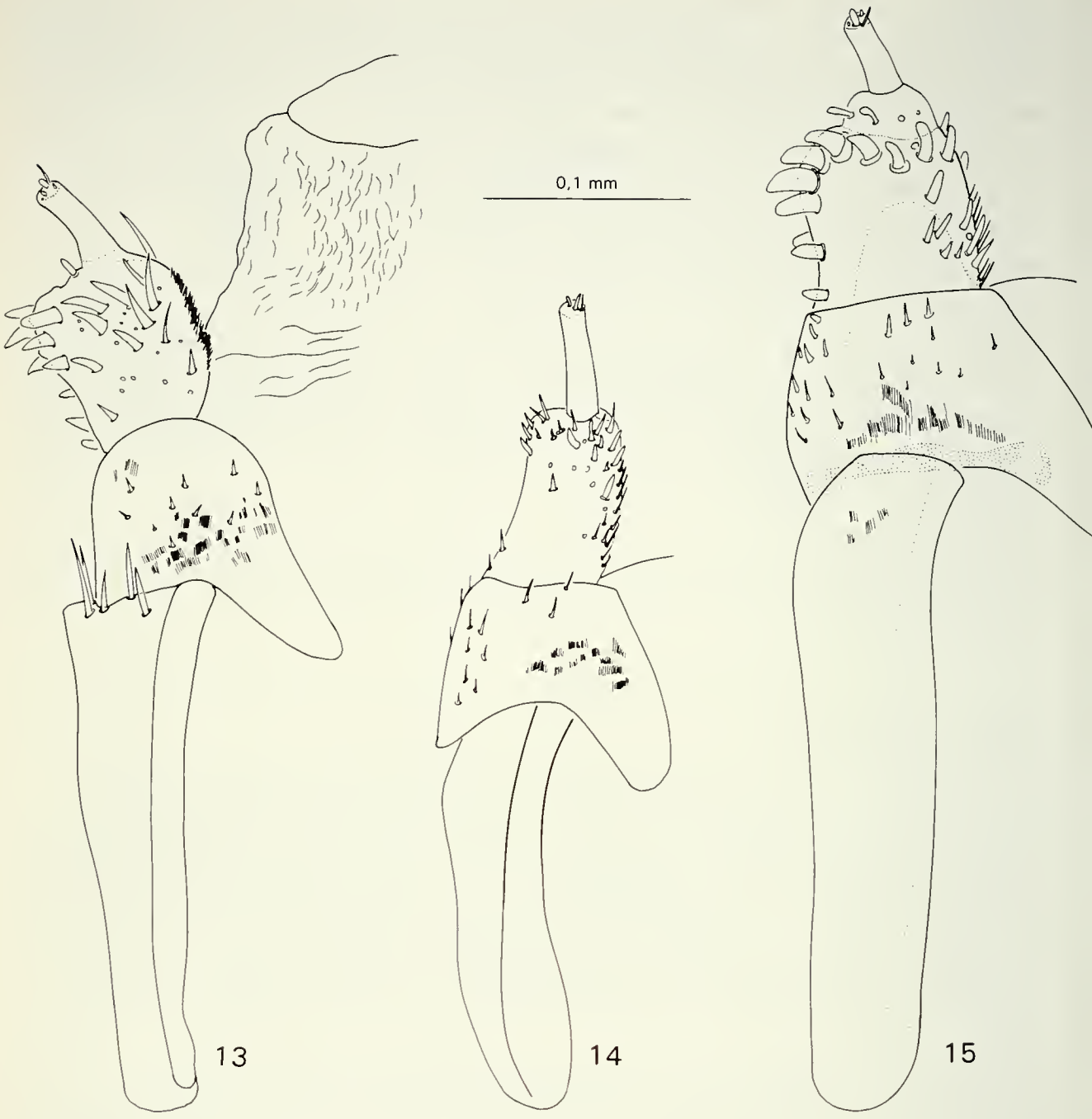
Material examined. Holotype ♂ (NMW): "N-Sumatra 99°11' E 3°07' N Dolok Merangir \ 21.2.1991 leg. Malicky". Paratypes: 9 specimens labelled as the holotype (NMW, MHNG); 9 specimens: "N-Sumatra 19.2.91 Bukit Maratya 99°14' E 13°00' N \ River Bahapal at light 200 m leg. Malicky" (NMW, SIW); 1 ♀: "S-Thailand 25.3.-22.4. Betong Laya distr. 1993 leg. J. Horak & J. Strnad" (NMW); 1 ♀: "S-Thailand Ton Nga Chang \ 6°58' N/100°12' E 4.-5.V.1993 600 m leg. Malicky" (NMW); 26 exs (NMW, CKB): "Malaysia - Sarawak ca 40 km E Kapit III.1994 leg. J. Kodada \ Rumah Ugap Ng marating Kapit Sut"; 9 exs (CHP, NMP, SNMB, TMB): "Malaysia - Sarawak ca 40 km E Kapit III.1994 leg. J. Horak \ Rumah Ugap Ng marating Kapit Sut".

Diagnosis. 2.0-2.3 mm long. Body form elongate, subparallel, dorsally flattened.

Colour yellowish, clypeus and posterior half of labrum dark brown to black, remainder of head, pronotum, elytra, hypomera, metasternum and legs with several black patches; the black patches of the pronotum can be gradually reduced; scutellum usually black or dark brown, rarely yellow; shape and size of these patches slightly variable. Terminal antennal segment (at least apically) and tarsal segments 2-4 brown.

Plastron hardly visible with stereoscopic microscope; probably covering same areas as in *A. acaroides*.

Labrum about as long as clypeus, its front margin feebly emarginate. Surface of labrum smooth or very superficially punctate; surface of clypeus smooth or rugulose; surface between and behind eyes granulate and shagreened. Antennae 11-segmented, slender, slightly longer than pronotum.



FIGS 13-15

Ovipositor (ventral aspect) of 13) *Ancyronyx malickyi* sp. n., 14) *A. sarawacensis* sp. n. and 15) *A. procerus* sp. n.

Pronotum distinctly wider than long; widest near middle; anteriorly attenuate; anterior margin strongly arcuate; margin between pronotum and hypomera not distinct; hypomera partly visible from above; anterior transverse groove moderately deeply impressed and slightly arcuate; a pair of postero-lateral oblique grooves shallowly impressed; surface of pronotum granulate. Scutellum triangular, slightly wider than long; acuminate apically; glabrous; without gibbiform tubercule.

Elytra elongate, approximately 3 times longer than pronotum; more or less parallel-sided; with 10 rows of punctures between suture and lateral margin; ca. 5 scutellary punctures present, forming a short accessory stria; strial punctures moderately deeply impressed; interstriae slightly convex, impunctate and glabrous; explanate margin of elytra not developed; humeri prominent; elytral apices subacute. Hind wing venation (Fig. 21) very similar to that of *A. acaroides*.

Prosternum distinctly wider than long, only very feebly produced in front of procoxae; posterior margin of prosternal process slightly bisinuous. Mesosternum very short; moderately deeply depressed medially. Metasternum large, with a shallow narrow longitudinal groove on midline; anterior one fifth superficially shagreened; discal area glabrous, superficially and scatteredly punctate; lateral declivity granulate and microreticulate.

Legs very long; at least partly covered with a very fine plastron; pro- and mesocoxae very large, clearly visible from above; claws very prominent, basis of each claw with 2 distinct teeth and a very small third one.

Abdomen with 5 visible segments. Female sternite VIII (Fig. 17).

Aedeagus (Fig. 2): Ejaculatory duct everted in all specimens which I have examined. It seems to lack the spiny operculum and the rake-like structure of *A. acaroides*, but seems more densely folded. Fibula long and slender, barely sclerotized. Parameres slender, apically pointed, with 3 moderately long apical setae. Phallobasis short.

Ovipositor (Fig. 13): Terminal segment slender. Preapical segment (main piece) short and stout, its distal sclerite slightly shorter than its proximal sclerite; distal sclerite with numerous strong spines in apical half, median margin finely pubescent; proximal sclerite with a finely striolate patch. Basal sclerite not distinctly longer than main piece and terminal segment together.

The distal end of the oviduct is extended in all females of *A. malickyi* sp. n. which I have examined. This is probably due to treatment with alcohol.

Variability. The black colour patches on pronotum, elytra and legs are somewhat variable in size and shape; the black patches on the pronotum may be even missing. Coloration of scutellum varies from black to yellow.

Distribution (Fig. 22). So far known from northern Sumatra, western Borneo and southern Thailand.

Etymology. Named for Doz. Dr. H. Malicky (Lunz).

Ancyronyx procerus sp. n.

Type locality. Tributary of Tutoh River, near Long Iman, Mulu National Park, northern Sarawak, Borneo, East Malaysia.

Material examined. Holotype ♂ (NMW): "Malaysia, Sarawak Mulu NP, Long Iman 4.3.1993 leg. M. Jäch (20)". Paratypes: 11 exs, same data as holotype (CKB, NMW, MHNG, SIW); 2 exs (CKB): "Malaysia - Sarawak ca 40 km E Kapit III.1994 leg. J. Kodada \ Rumah ugap Ng marating Kapit Sut".

Distribution (Fig. 22). So far known only from Borneo.

Diagnosis. 2.4-2.8 mm long. Body form elongate, subparallel, elytra dorsally flattened. Coloration: labrum dark brown or black, its front margin and middle frequently paler brown; mouth parts and antennae yellowish brown, terminal antennal segment more or less darkened; clypeus, frons and small area around eyes yellowish brown, remainder of head black; pronotum and hypomera yellowish brown, one pair of spots anterior to transverse groove on pronotum and one spot in middle of hypomeron black; scutellum black; elytra pale yellowish, anterior margin, a transverse band behind anterior margin and two spots (separated by interstria 5) on the declivity black; a large area extending

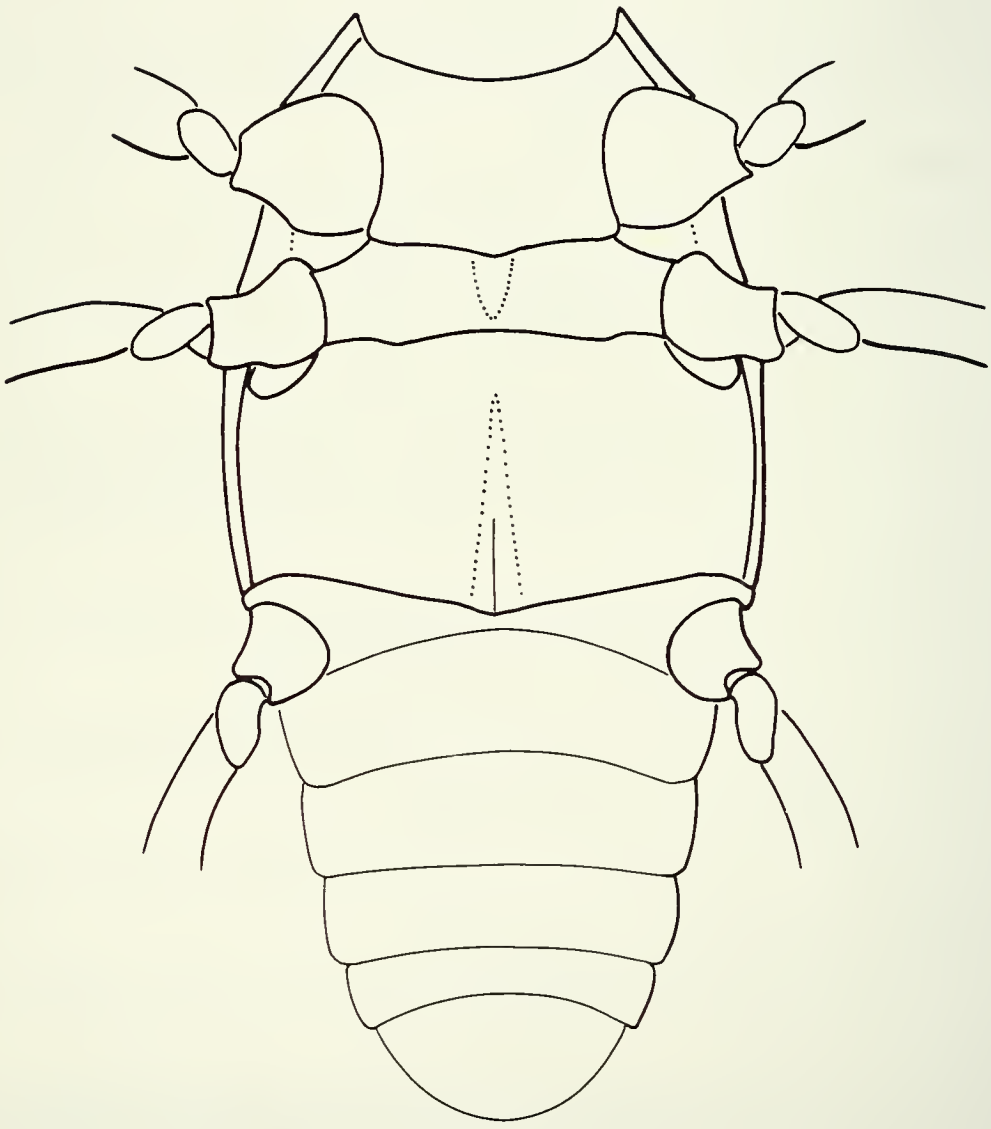


FIG. 16

Ancyronyx malickyi sp. n.: pro-, meso-, metasternum and abdomen.

from shoulder to apical third and from the lateral margin to stria 3 yellowish brown (slightly darker than pronotum), its medial and posterior margin black; area between anterior margin and anterior transverse band and suture posterior to transverse band also yellowish brown; under side and legs yellowish brown, a dorso-median and a dorso-apical spot on each femur and proximal half of each tibia black (the latter is usually interrupted by a brown band behind basis), apex of each tibia and tarsal segments 1-3 more or less darkened (brown to black).

Labrum about as long as clypeus, its front margin more or less straight. Surface of labrum finely punctate, smooth between punctures; remainder of head more densely punctate than labrum, partly microreticulate between punctures; antennae 11-segmented, slender, approximately as long as pronotum.

Pronotum wider than long, widest posterior to middle; anteriorly attenuate; anterior margin strongly arcuate; margin between pronotum and hypomera not distinct; hypomera partly visible from above; anterior transverse groove moderately deeply impressed and evenly arcuate; posterolateral oblique grooves shallow or obsolete; surface of pronotum granulately punctate. Scutellum pentagonal, approximately as wide as long; acuminate apically; glabrous; surface smooth and glabrous.

Elytra elongate, approximately 3 times longer than pronotum; more or less parallel-sided in anterior two thirds; with 10 rows of punctures between suture and lateral margin; ca. 5 scutellary punctures present, forming a short accessory stria; strial punctures large, deeply impressed; interstriae flat or slightly convex, impunctate and glabrous; explanate margin of elytra very narrow; humeri prominent; elytral apices conjointly rounded.

Prosternum distinctly wider than long, only very feebly produced in front of procoxae; posterior margin of prosternal process slightly bisinuous. Mesosternum very short; moderately deeply depressed medially. Metasternum large, with a shallow, narrow, longitudinal groove on midline; moderately densely granulate.

Legs very long; pro- and mesocoxae very large, clearly visible from above; claws very prominent, basis of each claw with 2 distinct teeth and a very small third one.

Abdomen with 5 visible segments.

Aedeagus (Fig. 9): Penis long and slender, lateral margins evenly and shallowly constricted in middle; fibula slender, not very long, barely sclerotized; corona not seen when ejaculatory duct is in repose. Parameres slender, apically tapering, without apical setae. Phallobasis very short.

Ovipositor (Fig. 15): Terminal segment slender. Preapical segment (main piece) short and stout, its distal sclerite slightly shorter than its proximal sclerite; distal sclerite with numerous blunt subapical and lateral spines, median margin finely pubescent in proximal half; proximal sclerite with a finely striolate patch. Basal sclerite distinctly longer than main piece and terminal segment together, finely striolate near apex, longitudinal sclerotized rod only feebly sclerotized.

Etymology. Latin (procerus), tall, long. In reference to the large size and elongate habitus.

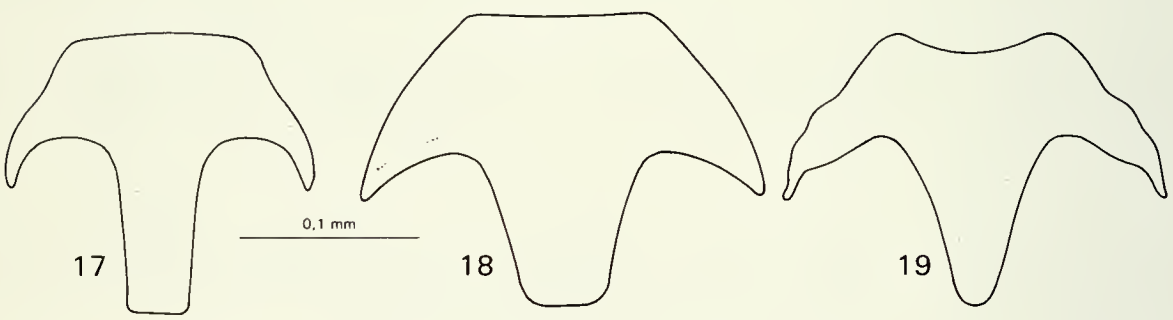
Ancyronyx sarawacensis sp. n.

Type locality. Tributary of Tutoh River, near Long Iman, Mulu National Park, northern Sarawak, Borneo, East Malaysia.

Material examined. Holotype ♂ (NMW): "Malaysia, Sarawak 1993 Kelabit HL, Umg. Bario 28.2., ca. 1000 m leg. M. Jäch (14)". Paratypes: 3 exs: "Malaysia, Sarawak 1993 Kelabit HL, 6 km E Bario Pa Ukat 27.2., 1000 m leg. M. Jäch (14)" (NMW); 3 exs: "Malaysia, Sarawak 1993 Kelabit HL, 6 km E Bario Pa Ukat 1.3., ca. 1000 m leg. M. Jäch (17)" (NMW, SIW); 7 exs: "Malaysia, Sarawak Mulu NP, Long Iman 4.3.1993 leg. M. Jäch (20)" (NMW, MHNG); 14 exs (NMW, CKB): "Malaysia - Sarawak ca 40 km E Kapit III.1994 leg. J. Kodada \ Rumah Ugap Ng´ marating Kapit Sut".

Diagnosis. 1.35-1.70 mm long. Body form obovate.

Colour yellowish, head posterior to antennal insertion, parts of pronotum, a number of spots on the elytra (a sutural spot behind scutellum; a triangular patch extending from elytral striae 3-7 on the basal half of the elytra; a larger sutural spot on the declivity and a subapical spot extending from elytral striae 5-8, separated from the sutural spot only by the yellowish 5th interstria), apex of all femora and proximal half of all tibiae dark brown to black. Terminal antennal segment, scutellum, lateral parts of metasternum, basal tarsal segments and apices of all tibiae usually brown.



Figs 17-19

Sternite VIII of female of 17) *Ancyronyx malickyi* sp. n., 18) *A. acaroides* and 19) *A. schillhammeri* sp. n.

Labrum shorter than clypeus. Dorsal surface of head posterior to clypeus densely punctate and microreticulate. Antennae 11-segmented, slender, slightly longer than pronotum.

Pronotum distinctly wider than long; widest near basal third; anterior margin strongly arcuate; lateral margin sinuous; sides indistinctly margined; surface granulately punctate and microreticulate, hypomera visible from above; a well impressed arcuate transverse groove divides the pronotum into a shorter apical and a longer basal part; postero-lateral oblique grooves shallow or moderately deeply impressed. Scutellum triangular or pentagonal; acuminate apically; surface more or less smooth.

Elytra approximately 2.5 times longer than pronotum; widest across humeri; with 10 rows of punctures between suture and lateral margin; strial punctures large and deeply

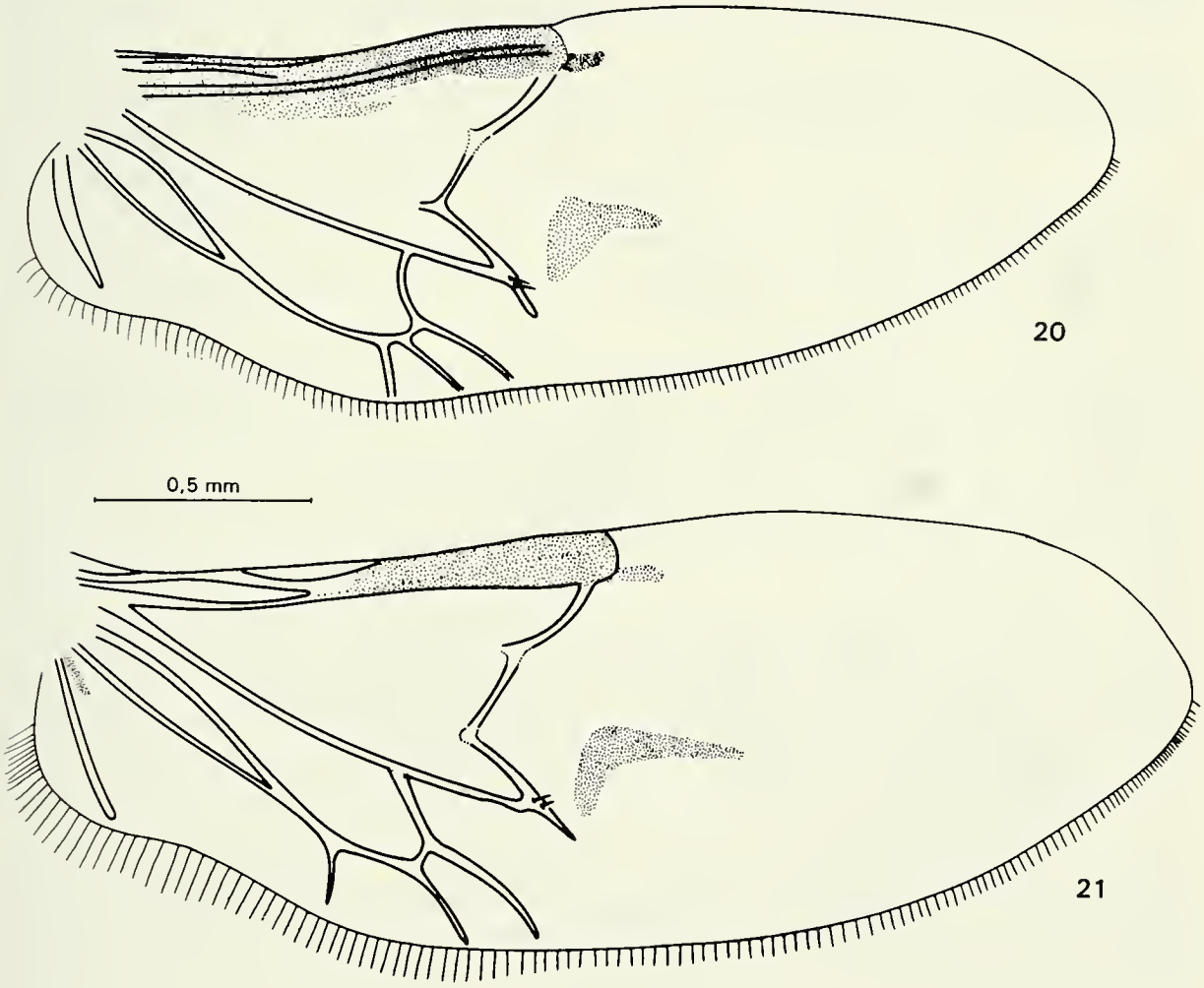
impressed; interstriae slightly convex, impunctate and glabrous; explanate margin of elytra very narrow; humeri prominent; elytral apices conjointly rounded.

Prosternum distinctly wider than long, only very feebly produced in front of procoxae; posterior margin distinctly bisinuous. Mesosternum very short. Metasternum large, with a deeply impressed longitudinal groove on midline; discal area sparsely punctate and glabrous; lateral declivity densely punctate.

Legs very long; each leg distinctly surpassing body length; metafemora distinctly surpassing elytral apices; pro- and mesocoxae very large, clearly visible from above; claws very prominent, basis of each claw with two small teeth.

Abdomen with 5 visible segments.

Aedeagus (Fig. 8): Penis long and slender, apex acuminate, sides not produced laterad; the latter character distinguishes this species readily from *A. acaroides*. Fibula long and slender, not strongly sclerotized. Corona not seen when ejaculatory duct is in repose.



FIGS 20-21

Hind wings of 20) *Ancyronyx acaroides* and 21) *A. malickyi* sp. n.

Parameres long and slender, distinctly shorter than penis, with ca. 2 inconspicuous short apical setae. Phallobasis very short.

Ovipositor (Fig. 14): Terminal segment comparatively long, slender. Preapical segment (main piece) short, but comparatively slender, its distal sclerite approximately as long as proximal sclerite; distal sclerite with numerous small spines in apical half; these spines are distinctly smaller than in the other species of the genus, median margin pubescent; parts of proximal sclerite finely striolate. Basal sclerite approximately as long as main piece and terminal segment together.

Variability. This species has been collected at 100 m (Mulu NP, locality 20) and at 1000 m (Kelabit Highlands; localities 14, 15 and 17) above sea level. Accordingly it displays some variability concerning coloration and body size. Specimens from 100 m are 1.35-1.40 and specimens from 1000 m are 1.4-1.7 mm long. Black markings usually more extensive in specimens from 1000 m, distinctly reduced in specimens from 100 m: frons usually entirely yellow in specimens from Mulu, pronotum (except area of hind angles) entirely black in the material from the Kelabit Highlands, black markings reduced to an antero-median and a postero-median patch in specimens from Mulu,

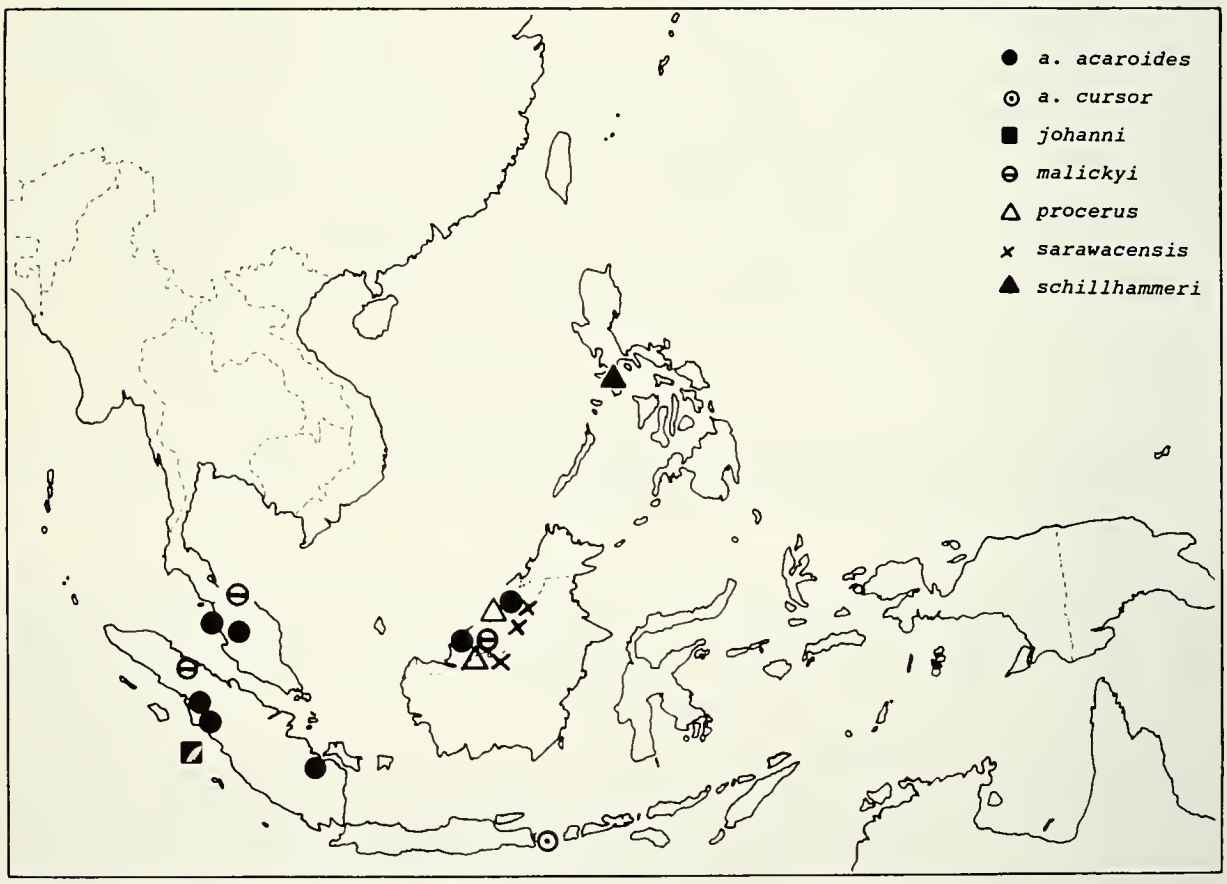


FIG. 22

Geographical distribution of the Oriental species of the genus *Ancyronyx*.

scutellary patch frequently extended along suture to be connected with subapical patches in Kelabit specimens. The material from the surroundings of Kapit agrees with the Mulu material.

Distribution (Fig. 22). Known only from Sarawak but probably more widely distributed in Borneo.

Etymology Named in reference to the geographical distribution.

Ancyronyx schillhammeri sp. n.

Type locality. Fast flowing river ("Hidden Paradise"), 5-10 m wide, west of Baco (= W of Calapan), northeastern Mindoro, Philippines.

Material examined. Holotype ♂ (NMW): "Philipinnen - Mindoro 20 km W Calapan 1992 Hidden Parad. 20.-21.11 leg. Schillhammer (10)". Paratypes: 3 specimens, same data as holotype (NMW).

Diagnosis. 1.9-2.2 mm long. Body form oblong, almost parallel-sided.

Colour black, the following parts yellowish: anterior margin of labrum and mouth parts, antennal segments 1-10, anterior margin of pronotum, two very small spots on basis of pronotum near scutellum, an X-shaped band on elytra, two subapical spots which are laterally connected with the X-shaped band, pro- and mesosternum, posterior margin of metasternum, distal half of all femora and tibiae, all tarsi and claws. Coxae, trochanters and discal areas of abdominal sternites brownish.

Surface of labrum more or less impunctate and glabrous, clypeus and frons densely punctate and microreticulate. Antennae 11-segmented, slender, about as long as pronotum.

Pronotum very distinctly wider than long; widest near basal third; anterior margin strongly arcuate; lateral margin sinuous; surface densely punctate and microreticulate; hypomera visible from above; a well impressed sinuous transverse groove divides the pronotum into a shorter apical and a longer basal part; oblique subbasal grooves present. Scutellum triangular or rectangular, wider than long; acuminate apically; microreticulate and mat.

Elytra approximately 2.5 times longer than pronotum; widest near basis; with 10 rows of punctures between suture and lateral margin; strial punctures large, deeply impressed and rather densely arranged and rugulose, especially near scutellum; short accessory stria present; interstriae very narrow and convex; explanate margin of elytra very narrow and more or less effaced; humeri prominent; elytral apices conjointly rounded.

Prosternum distinctly wider than long, only very feebly produced in front of procoxae; posterior margin bisinuous. Mesosternum very short; distinctly depressed medially for reception of apex of prosternum. Metasternum large, with a shallow, narrow, longitudinal groove on midline; discal area only sparsely punctate, smooth and glabrous between punctures; lateral declivity densely punctate.

Legs very long; each leg distinctly surpassing body length; pro- and mesocoxae very large, clearly visible from above; claws very prominent, basis of each claw with two subbasal teeth.

FIGS 23-28

Habitus of 23) *Ancyronyx acaroides* (Malaysia, Perak), 24) *A. johanni* sp. n. (Siberut, paratype), 25) *A. sarawacensis* sp. n. (Borneo, Mulu NP, paratype), not to same scale, 26) *A. schillhammeri* sp. n. (Mindoro, paratype), 27) *A. malickyi* sp.n. (Thailand) and 28) *A. procerus* sp.n. (Borneo, Mulu NP, paratype).

Abdomen with 5 visible segments; moderately densely punctate. Female sternite VIII (Fig. 19).

Aedeagus (Fig. 3): Median lobe moderately long, sides gently emarginate before middle; fibula well developed and long; corona situated near basis of parameres; endophallus strongly plicate; ejaculatory duct everted in one of the two males which I have examined, without any conspicuous sclerotized structures or distinct spines. Parameres distinctly shorter than median lobe, with numerous apical setae. Phallobasis short.

Ovipositor (Fig. 12): Terminal segment slender, moderately long. Preapical segment (main piece) short and stout, its distal sclerite slightly shorter than its proximal sclerite; distal sclerite with numerous blunt short spines, median margin finely pubescent. Proximal sclerite and apex of basal sclerite with a finely striolate area. Basal sclerite approximately as long as main piece and terminal segment together.

Variability. The X-shaped yellow marking on the elytra is interrupted near interstria 4 in one specimen.

Distribution (Fig. 22). So far known only from the type locality.

Etymology. Named for Harald Schillhammer, who collected this beautiful insect during our excursion to Mindoro.

DISCUSSION

According to ICZN (Art. 30 a), the gender of *Ancyronyx* is masculine (Greek: ho onyx). Early authors, e. g. MOTSCHULSKY (1859: 47): "Ancyronyx quadriplagiatus, *elongato-ovatus*, *antice attenuatus*, *postice subacuminatus*, ...", HORN (1870: 41): "*A. variegatus*" and ZAITZEV (1910) treated the genus as masculine. Only recently the gender was emended into feminine ("*Ancyronyx variegata*"), by BROWN (1972, 1983), WHITE (1989) and other North American authors, which is unjustified.

Comparison of the male and female genitalia and the under side of *Ancyronyx variegatus* and the Oriental species leaves no doubt that they are all congeneric. The general appearance of the male and female genitalia of *A. variegatus* (see Figs 1, 11) is remarkably similar to that of *A. sarawacensis* sp. n. (see Figs 8, 14), and although the endophallus of the single aedeagus of *A. variegatus*, which I have examined is not everted (corona in apical third of the penis), it can be inferred from its strongly plicate morphology that it is evertible, just like in the Oriental species.

GANGLBAUER (1904) erected the tribe Ancyronychini (including only the genus *Ancyronyx*) on account of the morphology of the prosternum which is not strongly produced anteriorly in *Ancyronyx* (see Fig. 16). This is obviously a plesiomorphic character state. Paramount phylogenetic surveys on the generic level have not been carried out in the Elmidae so far. A first attempt on a small scale was made by BERTHÉLEMY (1979). Thus we should consider all presently acknowledged tribes (Ancyronychini Ganglbauer, 1904, Elmini Shuckard & Spry, 1840 and Macronychini Steffan, 1961) as artificial.

A curious article, worth being briefly discussed, was published by BERTRAND & STEFFAN (1963). Based on an African species, the authors describe a new genus (*Pseudancyronyx* Bertrand & Steffan) related with *Ancyronyx* and transfer all tropical species described until then as *Ancyronyx* to their new genus. It is quite probable that BERTRAND & STEFFAN (1963) had not seen any of the 3 Oriental species since they represent in fact 3 different genera (*Ancyronyx*, *Podelmis* and *Stenelmis*), all of them quite different from "true" *Pseudancyronyx*.

The larva of *A. variegatus* was illustrated by BROWN (1972: Figs 151, 152) and WHITE (1989: Fig. 1F). It is characterized by postero-lateral processes on the abdominal segments 1-8. In a small river in the Mulu National Park in Sarawak I collected 9 larvae, associated with 3 species of *Ancyronyx* (*A. acaroides*, *A. procerus* sp. n. and *A. sarawacensis* sp. n.). They all have posterolateral processes on abdominal segments 1-8 and are undoubtedly larvae of the Nearctic-Oriental genus *Ancyronyx*.

KEY TO THE WORLD SPECIES OF THE GENUS ANCYRONYX

1 Elytral margin finely serrate (denticulate) in posterior fifth. Hind wings reduced in most specimens. Aedeagus (Fig. 1). Eastern Nearctic region ..... *variegatus*

— Elytral margin smooth, without any denticules (most species), or hardly noticeably serrate (one species from Borneo). Only fully winged specimens known so far. Aedeagus (Figs 2-9). Eastern Oriental Region 2

2 Distal apex of femora yellowish (Figs 26, 27). Aedeagus (Figs 2, 3): sides of penis straight or slightly emarginate, never strongly produced. Sumatra, Borneo, Thailand, Mindoro. 3

- Distal apex of femora at least partly black (Figs 23-25, 28). Aedeagus (Figs 4-9): sides of penis straight or strongly produced. Peninsular Malaysia, Borneo, Sumatra, Siberut, Bali. 4

3 Body coloration (Fig. 27) predominantly yellow, middle of pronotum and middle of frons always yellow. Aedeagus (Fig. 2): sides of penis straight; parameres tapering towards apex, with only about 3 setae. Sumatra, Borneo, Thailand. ..... *malickyi* sp. n.

- Body coloration (Fig. 26) predominantly black. Aedeagus (Fig. 3): sides of penis slightly emarginate; parameres widening apically, with numerous setae. Mindoro (Philippines). ..... *schillhammeri* sp. n.

4 Pronotum entirely or partly black anterior and posterior to transverse groove; middle of elytra yellowish or black along suture. Siberut, Borneo. 5

- Pronotum dark brown or black anterior to transverse groove, but always yellowish posterior to transverse groove; middle of elytra always yellowish or brown along suture (Figs 23, 28). Peninsular Malaysia, Borneo, Sumatra, Bali. 6

5 Pronotum almost entirely black or dark brown, only its front margin narrowly yellow; scutellum black; middle of elytra always dark brown (or black) along suture (Fig. 24). Aedeagus (Fig. 7): sides of penis strongly produced. Siberut (Indonesia). . . . . *johanni* sp. n.

- At least area of hind angles of pronotum always yellowish; scutellum yellowish or brown (Fig. 25). Aedeagus (Fig. 8): sides of penis straight. Borneo. . . . . *sarawacensis* sp. n.

6 2.4-2.8 mm long. Habitus (Fig. 28) elongate. Scutellum black or dark brown. Surface of pronotum rugulosely granulate. Aedeagus (Fig. 9): sides of penis very slightly emarginate, parameres inconspicuous. Borneo . . . . . *procerus* sp. n.

- 1.8-2.1 mm long. Habitus (Fig. 23) oval. Scutellum yellowish. Surface of pronotum smooth or punctate, never rugulose. Aedeagus (Figs 4-6): sides of penis strongly produced, apex of parameres (ventral aspect) strongly produced towards middle. Peninsular Malaysia, Borneo, Sumatra, Bali. 7

7 Aedeagus (Fig. 4): penis with apex slightly shorter, sides more straight. Peninsular Malaysia, Borneo, Sumatra. . . . . *acaroides acaroides*

- Aedeagus (Fig. 4): penis with apex slightly longer, its sides slightly emarginate. Bali. . . . . *acaroides cursor* ssp. n.

ACKNOWLEDGEMENTS

I am especially obliged to J. Horak, J. Kodada and Dr. H. Malicky for donating the material of *Ancyronyx malickyi* sp. n. and other interesting specimens from southeast Asia to the Natural History Museum, Vienna. I thank Prof. H.B. Brown for his comments on the manuscript. Thanks are due to Dr. Jan Kodada for providing the habitus photographs.

REFERENCES

Berthélemy, C. 1979. Elmidae de la région Palaearctique occidentale: systématique et répartition (Coleoptera Dryopoidea). *Ann. Limnologie* 15(1): 1-102.

Bertrand, H. & A. Steffan 1963. Elminthidarum genus novum e regione aethiopica: *Pseudancyronyx* (Coleoptera: Dryopoidea). *Bull. I.F.A.N.* 25: 827-837.

Brown, H.P. 1972. Aquatic Dryopoid beetles of the United States. *Biota of Freshwater Ecosystems, Identification Manual* 6: 1-82.

Brown, H.P. 1983. A catalog of the Coleoptera of America north of Mexico. *Agric. Handbk, USDA, Washington* 529-50: 1-23.

Erichson, W.F. 1847. Naturgeschichte der Insecten Deutschlands. Berlin: Nicolaische Buchhandlung, pp. 1-968.

GANGLBAUER, L. 1904. Die Käfer von Mitteleuropa. Wien: Karl Gerolds Sohn, pp. 1-286.

GROUVELLE, A. 1896. Potamophilides Dryopides, Helmides et Heterocerides des Indes Orientales. *Ann. Mus. Civ. Stor. Nat. Genova* 17: 32-56.

HORN, G. 1870. Synopsis of the Parnidae of the United States. *Trans. Am. Ent. Soc.* 3: 29-42.

JÄCH, M.A. 1984. Die Koleopterenfauna der Bergbäche von Südwest-Ceylon (col.). *Archiv Hydrobiol. / Supplementum* 69(2): 228-332.

MOTSCHULSKY, V. 1859. Insectes des Indes orientales et des contrées analogues. *Et. ent.* 8: 25-118.

WHITE, D. 1989. Defense mechanisms in Riffle Beetles (Coleoptera: Dryopoidea). *Annals Ent. Soc. America* 82(2): 237-241.

ZAITZEV, PH. 1910. Dryopidae, Cyathoceridae, Georyssidae, Heteroceridae. Berlin: W. Junk, pp. 1-47.